

A GUIDE TO COLLECTING PALMS¹

JOHN DRANSFIELD²

ABSTRACT

Because of their frequently bulky nature and unfamiliar morphology, palms need special attention if they are to be adequately collected. A guide is presented to indicate how to go about preparing good herbarium specimens of palms and what notes to make in the field.

The making of good herbarium specimens of palms is a laborious, time-consuming, and often rather unpleasant activity, and because of this many palm taxa are very poorly represented in herbaria. The general collector, faced with limited time and money and with the need to collect large numbers of plants to satisfy funding bodies or exchange agreements, tends to shy away from such awkward plants. To the specialist, however, the unhurried careful collection of a majestic palm can be immensely satisfying. It is probably too much to expect general collectors to use the amount of time spent by a specialist palm collector in the preparation of herbarium specimens, but with relatively little effort, the usual frustratingly inadequate palm specimen can be much improved. Guidelines for the collection of palms have already been provided by Tomlinson (1965) and, for climbing palms, Dransfield (1979). It is hoped that the present article will reach a wider audience and encourage more careful palm collecting.

ACCESS TO THE PALM

Low forest undergrowth and savannah shrub-like palms do not present many problems of access. Tall tree palms on the other hand can be very difficult to collect. There are three main methods of attack on such palms:

1. *Tree climbers.* In some parts of the tropics, local people are adept at climbing palms and when such people are employed as field assistants, the collecting of tall palms is usually relatively straightforward. However, some tree palms cannot be climbed because their trunk diameter may be too great, the trunks may be armed with spines, or the trunk and leaf bases may be infested with ants.

2. *Climbing irons, loops, and ropes.* Such mechanical aids to climbing are usually bulky

and require courage and practice to develop skill in their use. In some parts of the world they may be the only means of getting at fresh material of leaves and flowers without felling the palm.

3. *Felling.* There is no doubt that the felling of a palm provides the best access for collecting. Where a palm is multiple-stemmed, the felling of one stem for collection will probably do little permanent damage. However, in single-stemmed taxa, the collector is faced with the dilemma of completely destroying the palm. Where such a palm is abundant, the sacrifice of one individual seems justified. Even when a palm is rare, it may be possible to find individuals that can be sacrificed with a relatively clear conscience to the collector, e.g., if the forest area is being felled in any case. If a palm is felled, maximum use should be made of the opportunity provided by making several good collections. In populated areas of the tropics, palms may be the property of local people even if the plants are obviously wild. Considerable tact may be required to gain permission for collecting. It is also important to be aware of the dangers involved in the felling of a large palm tree. Palm crowns often provide shelter for a whole range of animals such as ants, hornets, reptiles, spiders, scorpions, birds, and bats. Although the dangers are probably not too great, it is certainly advisable to work with care when cutting off palm sheaths and disturbing the leaves. It is also worthwhile to scan the crown with binoculars for hornets, wasps, and bees before felling is begun.

EQUIPMENT

The services of one or two knowledgeable local people make palm collecting much easier, more entertaining, and usually provide ethnobotanical data. A "parang" or machete and a good pair of

¹ I am grateful to Carol Buckman for preparing the plates.

² Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, England.

secateurs are essential equipment. Secateurs should be of the type with two cutting edges rather than the type with a single blade working against a flat surface, favored by some collectors. Strong rough leather gloves are invaluable; it is best not to use gloves consisting of leather palms and canvas backs as these give insufficient protection to the backs of the hands. An axe may be invaluable but of course is yet one more heavy item to carry. A large supply of hanging tags with long strong thread is essential. The quality of collections is greatly enhanced by copious field notes, therefore a collecting book with plenty of room for notes is also essential. Photographs are of great value; the collector may wish to include a supplementary wide-angled lens with the photographic equipment, as it is frequently very difficult to photograph entire tree palms within forest with only a standard or macro lens. A supply of formalin acetic alcohol (F.A.A.) in wide-mouth plastic bottles and some muslin are important items for the preservation of material for morphological or anatomical study.

The method of preservation of the herbarium material will vary with local circumstances. It must be said, however, that in humid tropical conditions the modified Schweinfurth method using newspapers, methylated spirits or industrial alcohol, and large, thick gauge polythene bags is the easiest way of dealing quickly with the day's palm collections. Even during the dry season in savannah areas, it may take an inordinately long time to dry bulky palm material in the sun or over plant driers, and the longer drying takes, the more the flowers and fruits are likely to become detached from inflorescences and infructescences.

WHAT TO COLLECT

It is not proposed to discuss palm morphology in great detail in this guide, although a certain amount of discussion will be necessary for an understanding of what organs need to be collected. Those interested in a more detailed morphological account should refer to Moore (1973) and Moore and Uhl (1982).

For some genera sterile collections are useless, whereas for others, especially the Asiatic climbing palms, they can be of considerable value. Variation in leaf dissection is a feature of several undergrowth genera such as *Pinanga*, *Iguanura*, and *Geonoma*, and in these genera supplementary sterile collections illustrating leaf variation

are useful although not as reliable as when inflorescences can be collected too. Dead inflorescences and infructescences are well worth collecting if no fresh material is available or if fresh material is only sufficient for a unicate or one duplicate. When the frustrating circumstances arise of not being able to climb or fell a tree, fallen leaves and inflorescences, accompanied by photographs and good notes, will make a relatively good collection.

Deciding what parts of the palms should be collected is really a matter of common sense—how can the morphology of the whole palm be represented in the herbarium. A good collection should comprise adequate samples of all the organs of the palm available, coupled with notes to allow a reconstruction of the habit, dimensions, color, “hang” of leaves and leaflets, odor of flowers and fruit, and should be accompanied by ecological and ethnobotanical data (see Fig. 7). Ripe seed may be collected at the same time and be grown for research or ornamental purposes (see below), and pollen samples also can be conveniently made directly in the field.

In making collections, it is advisable to cut all palm pieces to the approximate size of a folded sheet of newspaper. It may not be possible or desirable in some instances (e.g., prophylls or peduncular bracts) to cut the object at all, and such larger objects may always be treated separately, however, it does help considerably if fragments are more or less of the same size. Each fragment must carry a hanging tag bearing the collection number written in pencil or ink insoluble in water or alcohol. This cannot be stressed too strongly; however, it does mean that a large supply of tags is essential. In building up a bundle to be treated with spirit using the Schweinfurth technique, experience has shown that the most satisfactory method is to begin by laying down four double thicknesses of newspaper opened out (Fig. 1a). This becomes the wrapping of the finished bundle (Fig. 1b). It is best to begin with flat leaf fragments, placing them in double or single folds of newspaper, and progress inwards to spiny or bulky fragments in the middle (to prevent puncturing of the polythene bags), followed by less bulky, flatter material at the top. The bundle can then be tied up within the four folds of double thicknesses of newspaper (Fig. 1b). The bundle is then put into a polythene bag, doused with spirit (it may be necessary to make holes in the top end of the newspaper folds to allow spirit to get to the mid-

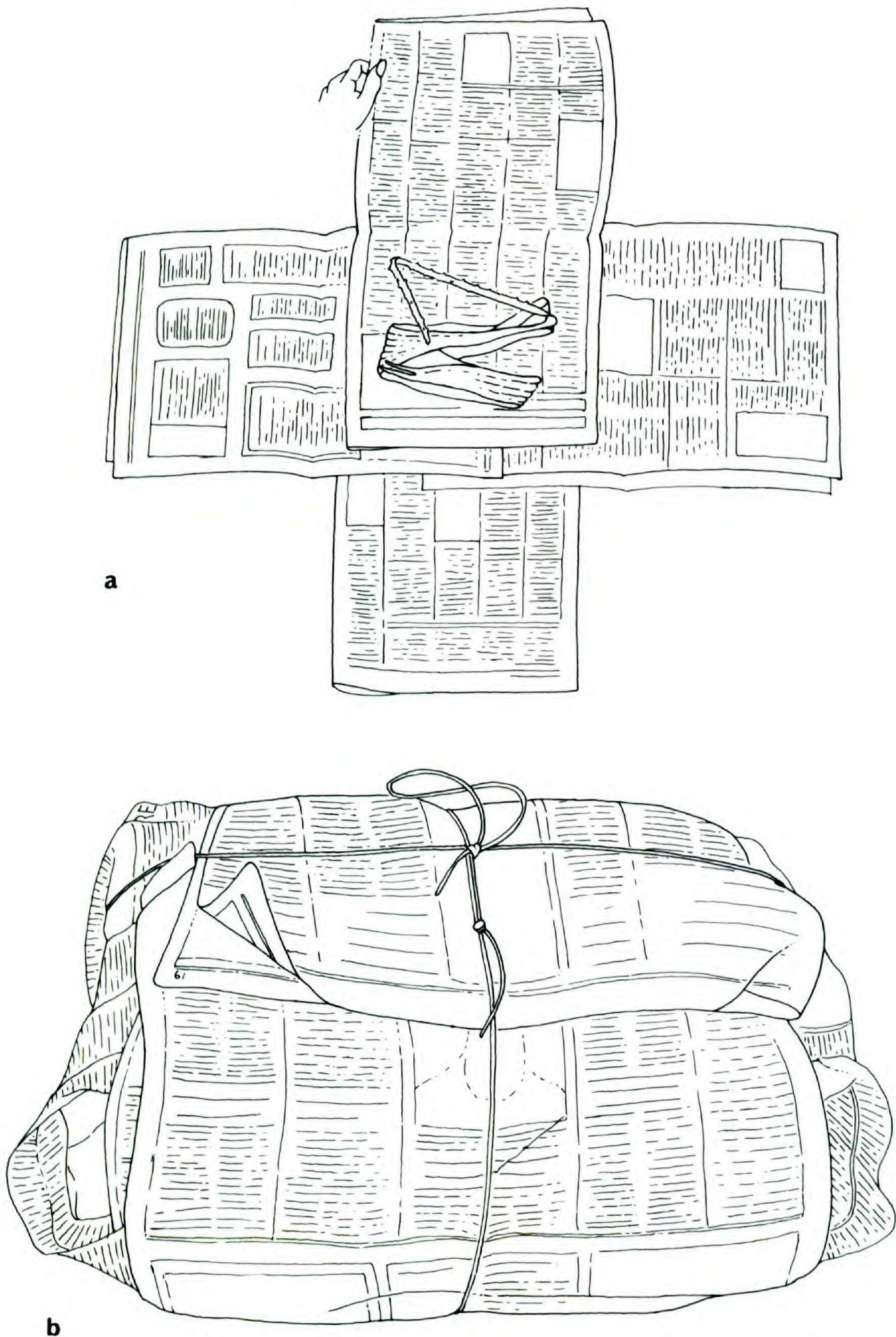


FIGURE 1.—a. Starting a bundle of palm specimens.—b. A finished bundle for enclosing in plastic and dousing with spirits.

dle of the bundle), and then tied up; the whole can then be put into a second polythene bag for safety. Because of their bulkiness it has been found that many palms, if well pressed and packaged, can put up with a certain degree of rough handling if the polythene covered bundles are sewn up in hessian sacks. They can tolerate two to five

months in transit if well soaked with spirit (before shipment it is advisable to check the state of the bundles in case drying out has occurred).

In the following notes, the general morphology of palms is briefly discussed, the parts necessary for a good collection indicated, and the need for notes explained.

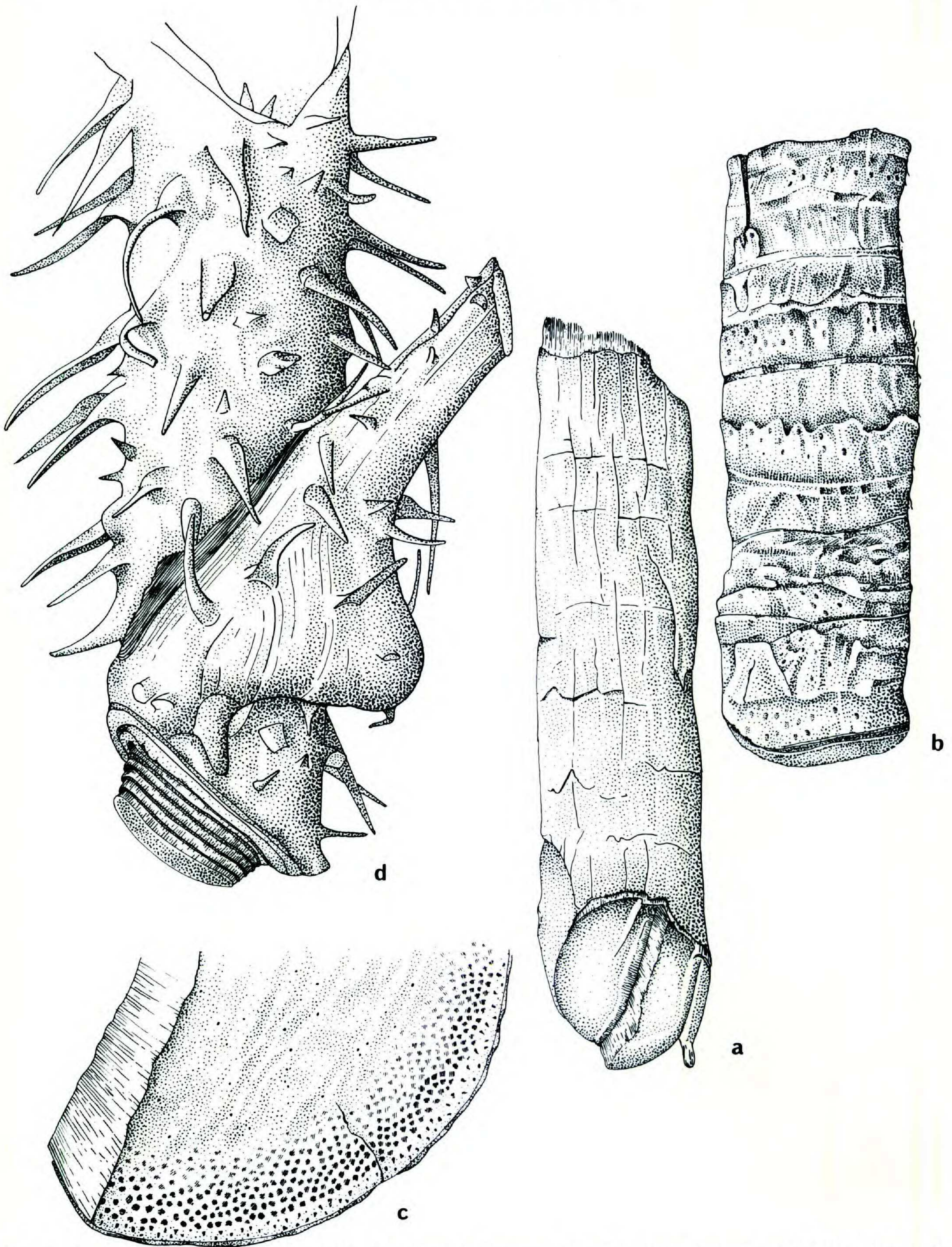


FIGURE 2.—a. Whole palm stem.—b. Surface slice of stem.—c. Cross-section of stem.—d. Rattan stem with leaf sheaths.

WHAT TO NOTE AND WHAT FRAGMENTS TO TAKE

General data. Locality, habitat, elevation, vernacular name and uses, and date.

Habit. Note whether palm is single-stemmed or clustered; if clustered whether the clump is close or diffuse, whether with stolons or not. Note whether the palm is a tall tree, or undergrowth palm, or “stemless” or climbing, whether stilt-

rooted or not. Estimate the total height. Photographs showing habit are of great value.

Stem. Note whether stem is bare or obscured with leaf sheaths or bases, whether aerially branched or not; if the stem is bellied this should be noted; note any armature, the type of nodal scars and the color. Measure the diameter with and without leaf sheaths, and the length of the internodes; estimate the total length if different from the palm height.

In small palms, collect a length of stem (Fig. 2a), which can be split vertically if necessary (Fig. 2b), and in large palms take a sample of the outer stem as if for a regular bark sample (Fig. 2c).

Roots. Note any peculiar rooting behavior (e.g., stilt-roots, spine-like adventitious roots, apogeotropic breathing roots, etc.). Collect samples or roots where appropriate.

Leaf in general. Note number of leaves in crown, their arrangement (distichous, tristichous, or spiral), whether neatly abscising, marcescent, or persistent, and try to describe general "hang" of leaves. Photographs showing leaf hang are invaluable.

Leaf sheath. Note whether tubular (Fig. 5c) or open (Fig. 5d), position of any splits, whether forming a crownshaft (Fig. 5c) or not, whether becoming fibrous; note any armature, indument and color. Measure length and width or diameter.

Collect whole sheath when small (Fig. 3a), and where large, collect sections of the sheath to include the base and apex, especially the junction of the sheath with the petiole. In climbing palms it is convenient to take the sheath sample as a section of stem and its surrounding sheaths that need not be removed (Fig. 2d).

Petiole. Note presence or absence; if present note any general features of indument and armature. Measure length and, where too large to represent, width.

If short, collect whole petiole including the insertion of the first leaflet or base of the lamina (in fan palms). If long, collect portions to illustrate any changes in form or armature along the length and a piece to include the insertion of the first leaflet or base of the lamina (Figs. 2a, 3c).

Blade. Note general characteristics and dimensions; whether palmate, costapalmate, pinnate, bipinnate, entire, or bifid. Measure the length of the rachis or costa.

In pinnate palms note the number of leaflets on each side and how they are arranged (regularly, grouped, in one plane or several, pendulous, etc.) and any special color features.

In palmate palms note the number of segments

where leaf too large to collect whole, whether stiff or pendulous, and any special color feature.

Collect whole leaf where very small; the blade may be folded up if necessary. When of moderate size collect the base of the blade (Fig. 3a), a mid-portion (Fig. 3b), and the leaf tip (Fig. 3c), the leaflets or segments may be removed from one side of the rachis. When very large, the same samples are required but they may comprise one or two leaflets only; the rachis may have to be split and the leaflets folded up. In fan palms collect the tip of the petiole with the blade base (Fig. 4c) and hastulae and basal segments on one side, and two pieces of blade to include the central segments and lateral segments (Fig. 4d).

In climbing palms. In addition to the above features, note the position of the climbing whips—whether an extension of the leaf rachis (cirrus) (Fig. 5a) or borne on a leaf sheath (sterile inflorescence = flagellum) (Fig. 5b). Collect a sample climbing organ, which may be folded up (use gloves!).

Inflorescence. Note position—suprafoliar, interfoliar, or infrafoliar, whether solitary or multiple, and whether shorter or longer than the leaves. A photograph of the whole inflorescence would be very helpful. Note the sex (if possible), whether hermaphrodite, polygamous, monoecious, staminate, or pistillate (in dioecious species never ever mix sexes in the same collection number; give them each a separate number).

Peduncle. Note orientation and measure length; note any special features of indument.

Primary bracts. Note number; the prophyll (Bract 1) is often obscured by leaf sheaths but is of considerable taxonomic importance.

Rachis. Note length.

Branching. Note whether inflorescence branched or unbranched and count the numbers of orders of branching. Where first order branches are distant and highly differentiated, so-called partial inflorescences can be distinguished; when so, their number should be recorded.

Rachillae. Note length, orientation, and color.

Flowers. Note color and scent. Close-up photographs of flowers are very useful. Even fallen flowers may be of value.

Collect. If small, collect the whole inflorescence (thus saving much of the above note-taking), taking great care not to miss the prophyll. The prophyll may be caducous; if so it should be searched for on the ground or among the leaf sheaths. If large, then collect the pro-

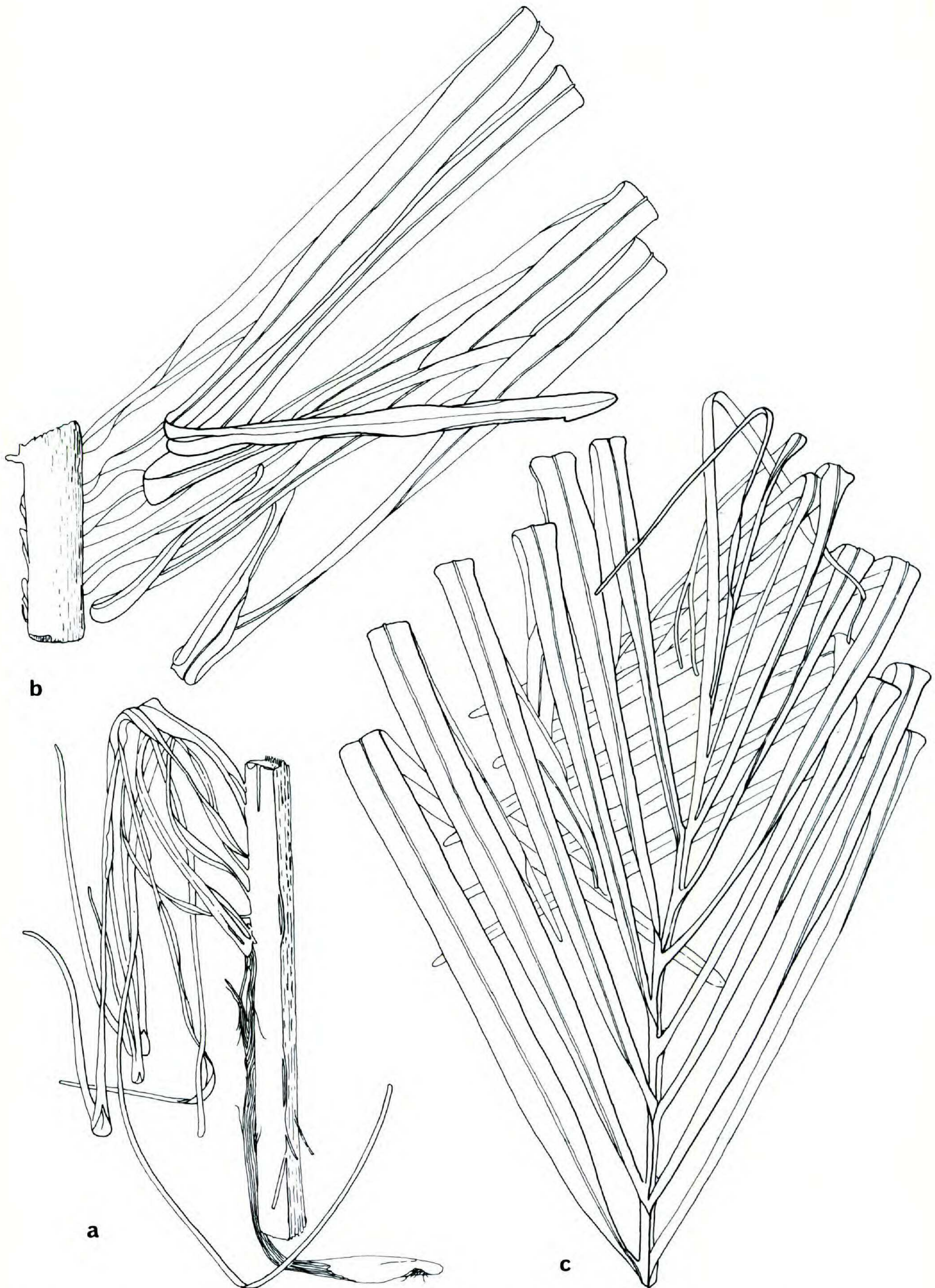


FIGURE 3. Pinnate leaf prepared for pressing.—a. Base.—b. Middle section, pinnae of one side removed.—c. Tip.

phyll and representative primary bracts, a portion of the peduncle, rachis (Fig. 6), and rachillae.

Try to collect more than one stage of de-

velopment from the same palm; if not possible, do not mix numbers. Inflorescences from the same palm may be cut up later so that each duplicate has a major inflorescence represen-

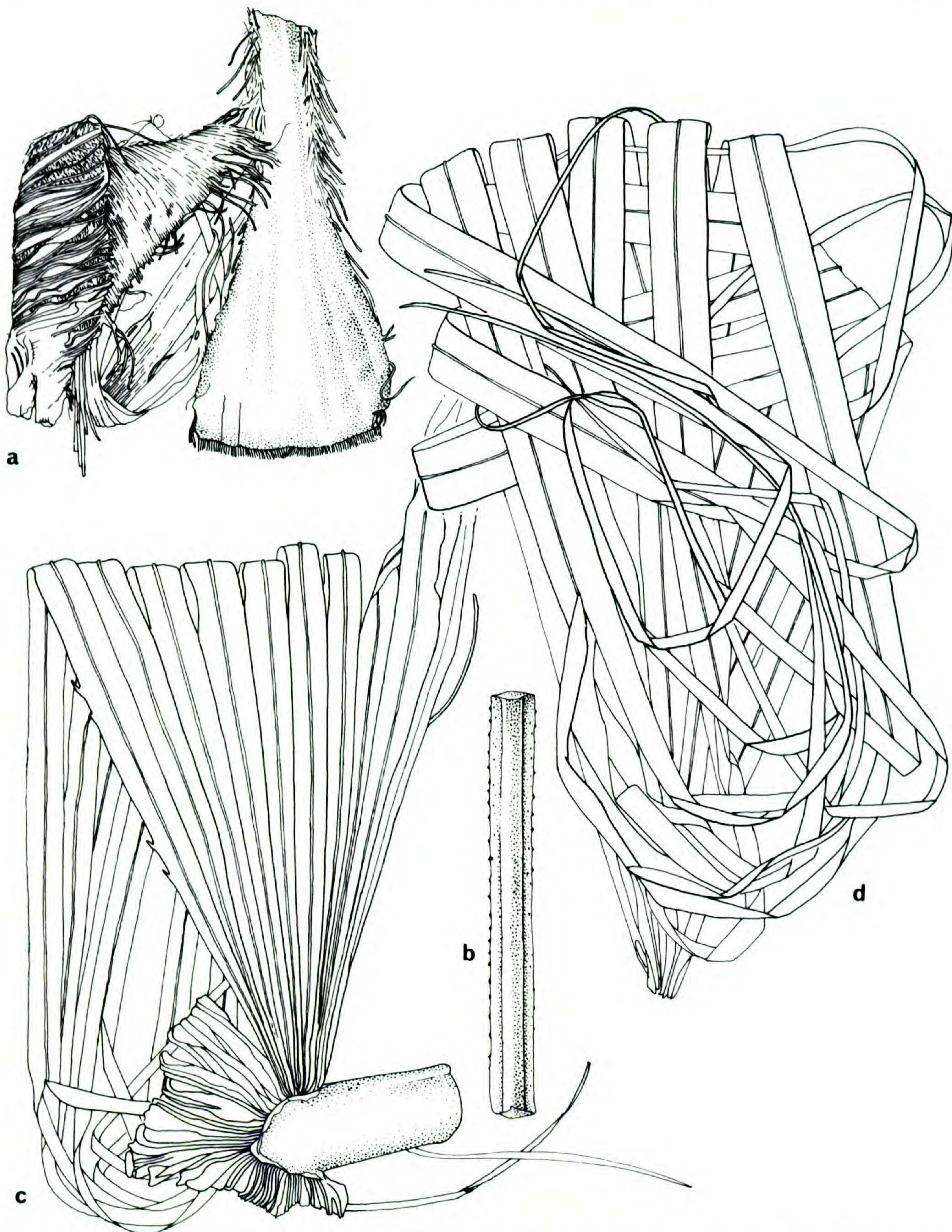


FIGURE 4. Palmate leaf prepared for pressing.—a. Sheath.—b. Petiole section.—c. Base of blade with all segments removed except at one side.—d. Middle portion of blade.

tation coupled with fragments (rachillae) at different stages.

Fruit. Note any color difference between inflorescence and infructescence. Note color of fruit. Close-up photographs of fruit are helpful. Collect infructescence, rachillae, and fruit.

Seedlings. Seedlings at the foot of a palm may not belong. They should be included with the

main collection only when there is no doubt as to their provenance.

PALM SEED

Ripe palm seed is easily transported without loss of viability if germination requirements are understood, and the opportunity to collect seed

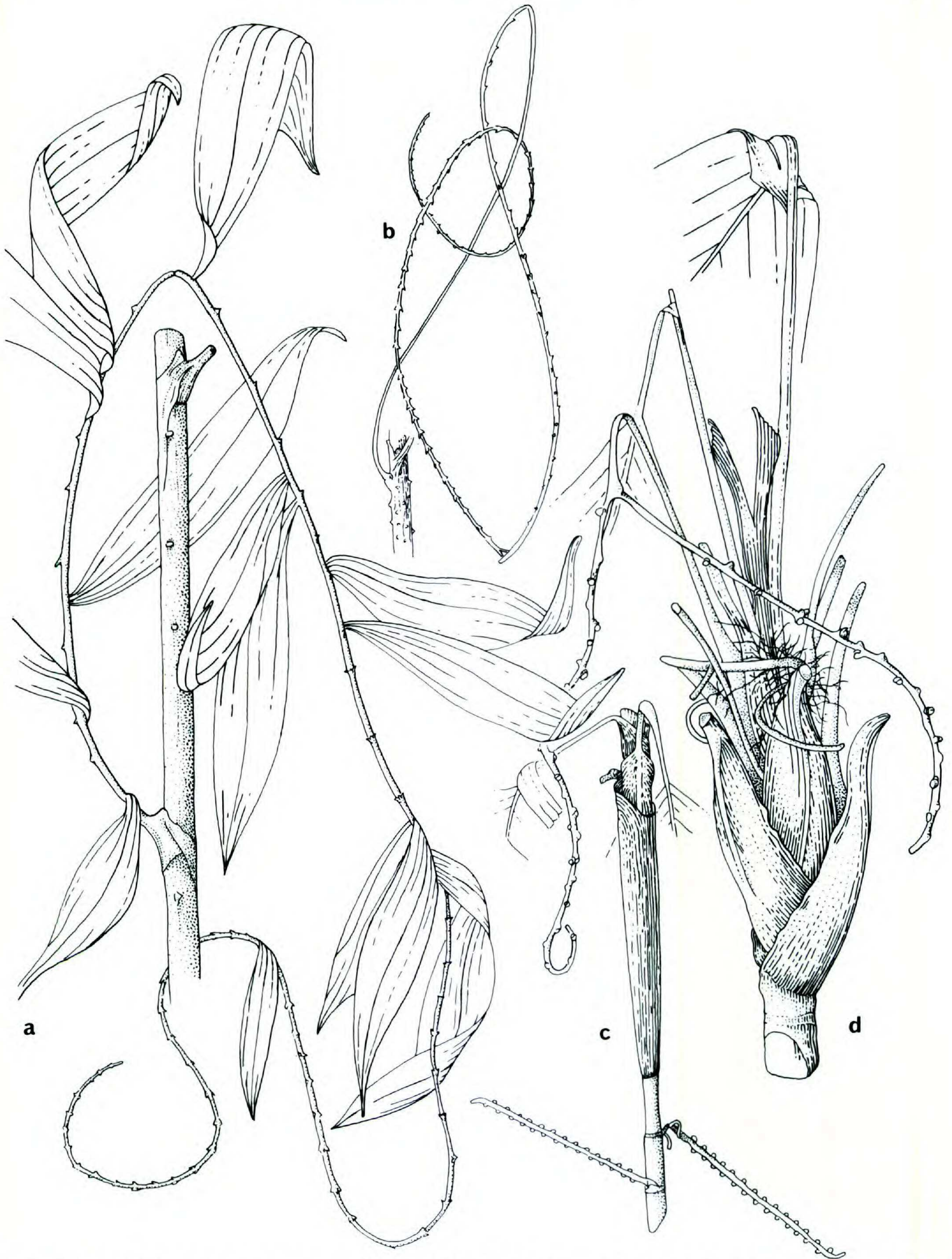


FIGURE 5.—a. Rattan with a cirrus.—b. Rattan with a flagellum.—c. Stem bearing a crownshaft.—d. Stem bearing open sheaths.

should not be wasted. There is a great demand for palm seed for ornamental purposes, both from botanic gardens and amateur enthusiasts. Furthermore, it is sometimes possible, though tricky,

to obtain chromosome counts from the root-tips of seedling palms, and the seedling stages of many species are not known and could be usefully recorded by growing seed of known source. The

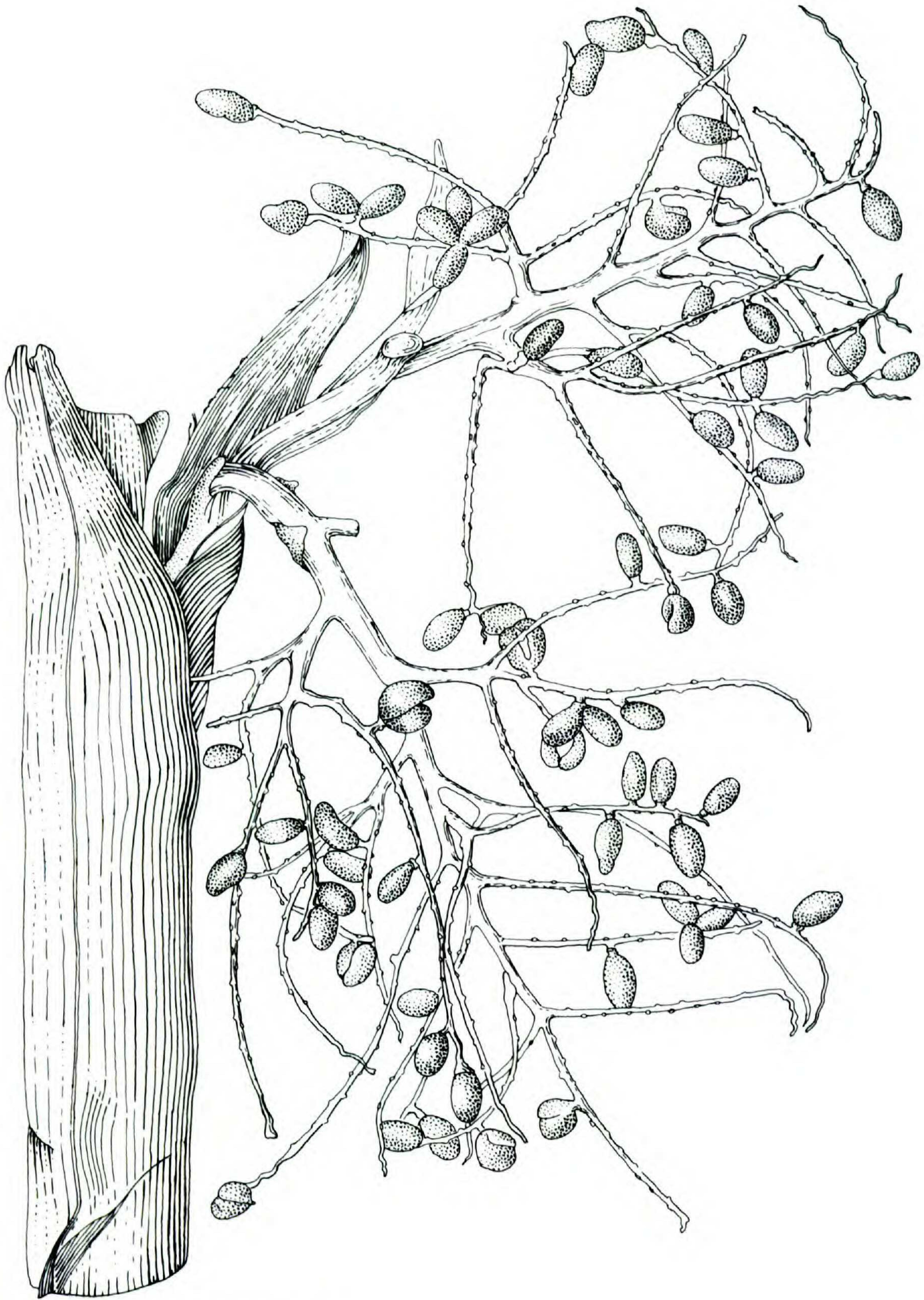


FIGURE 6. Portion of an infructescence.

International Palm Society's Seed Bank acts as a distribution center for palm seed, sending seed to botanic gardens and its members. Collectors contemplating gathering seed should be aware of phytosanitary and conservation regulations and may also wish to consult the Seed Bank. Ripe seed should be cleaned of any soft pulp. This is often most easily effected by trampling on the

whole fruit in a bag and then allowing the pulp to rot for a couple of days; the seed may then be easily cleaned in water. Seed should then be packed damp (not wet) in sphagnum or soft toilet tissue in polythene bags and then posted airmail or carried. Seed may happily germinate in the bags and may be stored for several months. Drying out is lethal to most palm seed.

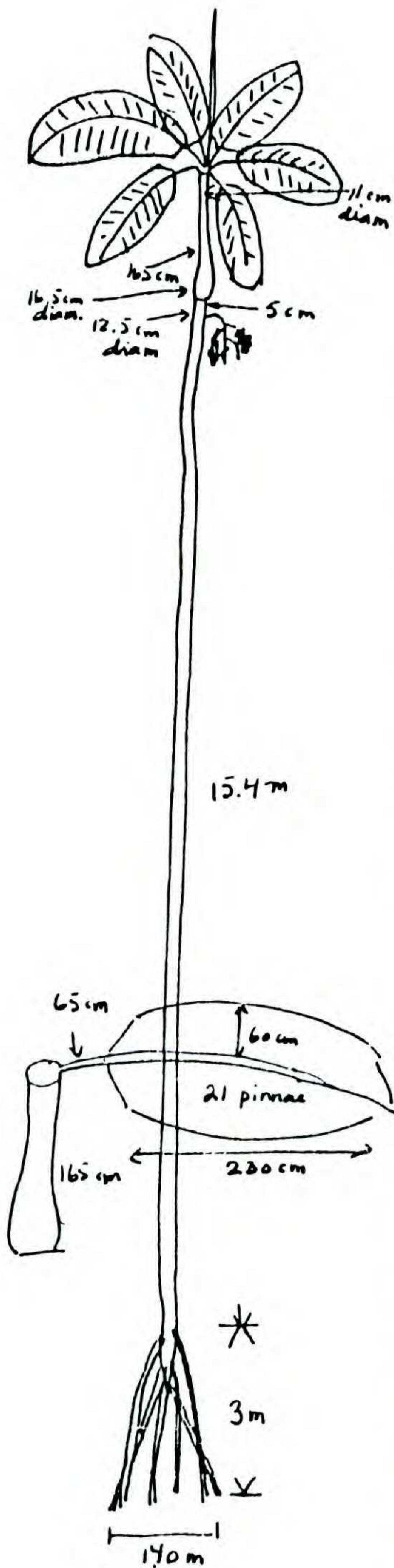
HERBARIUM KEWENSE
PALMAE

ARECACEAE

Socratea sp.

Spanish: "Chonta cade"

ECUADOR, Prov. PASTAZA: 4 km south of Shell towards Madre Tierra, just west of Puyo (01°30'S; 78°03'W). Remnants of tropical forest, 1050 m elev. 16 Mar 1983.



A solitary tree in remnants of virgin forest, but often left in otherwise deforested areas. The base of the trunk is lifted from the ground by about 15 up to 3 m long and 5-8 cm in diam, brown, spiny adventitious roots that form a loose open inverted cone, 3 m high and 140 cm wide at the base. Trunk straight, smooth, grey, 15.4 m long, about 13 cm in diameter throughout. Crown of 6 expanded leaves and 1 lance-like, erect young leaf in the center; crownshaft 165 cm long, 16.5 cm in diameter at the base, tapering to 11 cm apically; petioles 65 cm long; blades 230 x 120 cm with 21 pinnae on each side, each pinna divided and the base twisted on the rachis so it forms a fan in a plane perpendicular to the rachis and the entire blade is therefore 3-dimensional, almost with the appearance of a fox's tail. Inflorescence inserted 5 cm below the crownshaft, the peduncle first ascending, then dropping into the rachis which bears long hanging branches of 1st order only. Fruits immature, green. Uses: According to Sr. Armando Ortiz Silva, lumberman, carpenter and agriculturer in Moravia, the fruit is not eaten, the trunk is soft and not good for construction purposes. The palmhart is sometimes good, but this one proved bitter, maybe because the crown had a young lance-like leaf in the middle. According to the maid at hotel Turingia in Puyo, however, the seeds are eaten when young and soft.

Duplicates: QCA, Latinrecu, NY, K, AAU.

H. BALSLEV & L. BRAKO No. 4279

Socratea rostrata Burret
(vel valde aff.)

DET. J. DRANSFIELD 24.6.1983

FIGURE 7. An exemplary herbarium label.

MATERIAL FOR LIQUID PRESERVATION

Material preserved in formalin acetic alcohol (F.A.A.) is ideal for most morphological and anatomical studies and for illustrations of flowers.

F.A.A. is made by mixing 90 parts of 50% ethyl alcohol, five parts glacial acetic acid, and five parts concentrated formalin. After fixation in F.A.A. for a few days material can remain in F.A.A. or be transferred to 70% ethyl alcohol,

allowing the F.A.A. to be used again. F.A.A. can only stand a little re-use, but it is useful to know this where space and resources are limited. Wide-mouth bottles are essential. Fragments for preservation should be clearly labelled with a tag written in pencil and then should be wrapped in a piece of muslin or gauze and placed in F.A.A. in a bottle. The use of muslin allows for the inclusion of several different collections in the same bottle and also helps decrease damage during inevitable shaking. The most useful fragments for preservation are samples of rachillae with flowers at various stages of development and fruits at various stages of maturity. If inflorescence primordia are available (search among the young leaf sheaths) these can be of great value

and should be preserved entire, where possible. In more specialist collecting, samples of stem, root, petiole, rachis, and lamina should also be included with the reproductive organs in the liquid preserved collections.

LITERATURE CITED

- DRANSFIELD, J. 1979. A manual of the rattans of the Malay Peninsula. *Malayan For. Rec.* 29: 1-270.
- MOORE, JR., H. E. 1973. The major group of palms and their distribution. *Gentes Herb.* 11: 27-140.
- & N. W. UHL. 1982. Major trends of evolution in palms. *Bot. Rev. (Lancaster)* 48: 1-69.
- TOMLINSON, P. B. 1965. Special techniques for collecting palms for taxonomic study. *In* F. R. Fosberg & M.-H. Sachet. *Manual for Tropical Herbaria*. *Regnum Veg.* 39: 112-116.